ANBCA2

ANALYTICAL BIOCHEMISTRY

An International Journal of Methods in the Biological Sciences

EDITOR-IN-CHIEF

William B. Jakoby

EXECUTIVE EDITORS

Assistant to the Editor-in-Chief, William S. Allison

Shelby L. Berger
Ludwig Brand
Peter Brodelius
Jack E. Dixon
Theodore Friedmann
Othmar Gabriel
John A. Hanover
William F. Harrington
Tony E. Hugli
Richard D. Klausner
John H. Law
Y. C. Lee
Walter M. Lovenberg
William D. McElroy
Richard N. Perham
James F. Riordan
J. Edwin Seegmiller
B. David Stollar
Clarence H. Suelter
Bert L. Vallee
Helen Van Vunakis
Arthur Weissbach

Alvin Nason, Founding Editor, 1960–1977
Nathan O. Kaplan and William D. McElroy,
Editorial Committee Co-Chairmen, 1978–1986

Volume 175, 1988

ACADEMIC PRESS, INC.

Harcourt Brace Jovanovich, Publishers

San Diego New York Boston
London Sydney Tokyo Toronto

Copyright © 1988 by Academic Press, Inc.

All Rights Reserved

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopy, recording, or any information storage and retrieval system, without permission in writing from the copyright owner.

The appearance of the code at the bottom of the first page of an article in this journal indicates the copyright owner's consent that copies of the article may be made for personal or internal use, or for the personal or internal use of specific clients. This consent is given on the condition, however, that the copier pay the stated per copy fee through the Copyright Clearance Center, Inc. (27 Congress Street, Salem, Massachusetts 01970), for copying beyond that permitted by Sections 107 or 108 of the U. S. Copyright Law. This consent does not extend to other kinds of copying, such as copying for general distribution, for advertising or promotional purposes, for creating new collective works, or for resale. Copy fees for pre-1988 articles are as shown on the article title pages; if no fee code appears on the title page, the copy fee is the same as for current articles.

0003-2697/88 $3.00

MADE IN THE UNITED STATES OF AMERICA

CONTENTS OF VOLUME 175

NUMBER 1, NOVEMBER 15, 1988

In Memoriam. Marlene A. DeLuca
William S. Allison, Mary E. Dempsey, and Ed (Igor) Jablonski 1

Review. Firefly Luciferase as a Tool in Molecular and Cell Biology
Stephen J. Gould and Suresh Subramani 5

Review. Clinical and Biochemical Applications of Luciferases and Luciferins
Larry J. Kricka 14

The Measurement of Cytochrome b_{559} in Polymorphonuclear Leukocytes and Macrophages in the Presence of Hemoglobin or Mitochondrial Cytochromes
Aihao H. Ding and Carl F. Nathan 22

A Simplified High Speed Multicolor Immunoblotting Method
Nancy Lee, Jinshui Yang, and Douglas Testa 30

A Method for Staining and Stabilizing Peroxidase Activity in Polyacrylamide Gel Electrophoresis
Moshe Shimoni and Reuven Reuveni 35

Conversion of the Beckman Liquid Phase Sequencer to a Gas–Liquid Phase Sequencer
Ajit S. Bhown, James L. Wayland, Jr., J. Daniel Lynn, and J. Claude Bennett 39

Real Time Computer Tracking of Free-Swimming and Tethered Rotating Cells
P. S. Poole, D. R. Sinclair, and J. P. Armitage 52

An Optical Method for the Determination of the Isotopic Composition of $^1H_2O/^2H_2O$ Mixtures: Eu^{3+} Luminescence Lifetimes
Emily H. Cornwall and William DeW. Horrocks, Jr. 59

A High Capacity, Reusable Oligodeoxythymidine Affinity Column
Terry Chow, Carl Juby, and Leonard Yuen 63

A Rapid Procedure for Isolating Hemopoietic Cell Nuclei
Christopher M. Bunce, Jane A. Thick, Janet M. Lord, Deryck Mills, and Geoffrey Brown 67

High-Performance Liquid Chromatographic Assay of Biphenyl Metabolism by Hepatocytes Cultured in an Embryo/Hepatocyte Co-culture Medium
M. Leonard Mole, Linda Sanders, and Linda A. Oglesby 74

Transmission Densitometry of Stained Nitrocellulose Paper
Rose A. Maciewicz and Peter J. Knight 85

Detection of Tubulin-Binding Proteins by an Overlay Assay
Leonor Kremer, Jorge E. Domínguez, and Jesús Avila 91

Separation of Neutral Reducing Oligosaccharides Derived from Glycoproteins by HPLC on a Hydroxylated Polymeric Support
Brad Bendiak, Jeanne Orr, Inka Brockhausen, George Vella, and Charles Phoebe 96

Macromolecule Entrapment in Human Placental Microvillous Membrane Vesicles
Nicholas P. Illsley, Jayne G. Goodman, A. S. Verkman, and B. Davis 106

A Parameterized Overspeeding Method for the Rapid Attainment of Low-Speed Sedimentation Equilibrium
Ronald C. Chatelier 114

Evaluation of an Isoluminol Chemiluminescence Assay for the Detection of Hydroperoxides in Human Blood Plasma
Balz Frei, Yorihiro Yamamoto, Daniel Niclas, and Bruce N. Ames 120

A Rapid Fluorometric Assay for N-Terminal Glutaminyl Cyclase Activity Using High-Performance Liquid Chromatography
Angelo P. Consalvo, Stanley D. Young, Barry N. Jones, and Paul P. Tamburini 131

Spectrophotometric Determination of Hydrazine, Hydrazides, and Their Mixtures with Trinitrobenzenesulfonic Acid
Xiao-yang Qi, Nemat O. Keyhani, and Yuan Chuan Lee 139
Quantitative Evaluation by Computer-Based Video Densitometry of Film Response to Different Isotopes and Fluorographic Treatments *R. Dino Rulli* 145
Affinity Separation of Proteins in Aqueous Three-Phase Systems
Per-Åke Albertsson and Gerd Birkenmeier 154
Gradient Ion Chromatography of Inositol Phosphates
Brian Q. Phillippy and John M. Bland 162
Direct Analysis of Glycolipids on Thin-Layer Plates by Matrix-Assisted Secondary Ion Mass Spectrometry: Application for Glycolipid Storage Disorders
Yasunori Kushi, Chiaki Rokukawa, and Shizuo Handa 167
Evaluation of Methods for the Isolation of Plasma Membranes Displaying Guanosine 5′-Triphosphate-Dependence for the Regulation of Adenylate Cyclase Activity: Potential Application to the Study of Other Guanosine 5′-Triphosphate-Dependent Transduction Systems
Kevin K. Caldwell, M. Karen Newell, John C. Cambier, Kedar N. Prasad, Joseph M. Masserano, Werner Schlegel, and Dermot M. F. Cooper 177
Visualization of Multiple Protein Bands on the Same Nitrocellulose Membrane by Double Immunoblotting *Maria L. Poor, Paula F. Santa, and G. Sitta Sittampalam* 191
Filter-Supported Preparation of λ Phage DNA
R. Jakobi, S. Wiemann, and W. Pyerin 196
Determination of the Carbohydrate Composition of Mammalian Glycoproteins by Capillary Gas Chromatography/Mass Spectrometry *Patrick C. Elwood, William K. Reid, Paul D. Marcell, Robert H. Allen, and J. Fred Kolhouse* 202
An Isotopic Rubidium Ion Efflux Assay for the Functional Characterization of Nicotinic Acetylcholine Receptors on Clonal Cell Lines
Ronald J. Lukas and Mary Jane Cullen 212
A Normal Phase High-Performance Liquid Chromatography System for Steroid 17α-Hydroxylase/C_{17-20} Lyase (Cytochrome *P*-450_{21scc}) Assays
Gerald L. Schatzman, Marie E. Laughlin, and Thomas R. Blohm 219
Colorimetric Determination of Phytate in Unpurified Extracts of Seeds and the Products of Their Processing *Iosif A. Vaintraub and Natalya A. Lapteva* 227
Investigation of the Bicinchoninic Acid Protein Assay: Identification of the Groups Responsible for Color Formation
Karen J. Wiechelman, Robert D. Braun, and Jimmie D. Fitzpatrick 231
A Chemical Kinetic Model for Ligand Binding to Identical and Independent Binding Sites *in Vivo* *Jeffrey P. Bond and Angelo C. Notides* 238
Fecal Methylamine and Dimethylamine in Chronic Renal Failure
Sadao Baba and Yoko Watanabe 252
Detection of Tetrodotoxin by Thin-Layer Chromatography/Fast Atom Bombardment Mass Spectrometry *Yuji Nagashima, Sachio Nishio, Tamao Noguchi, Osamu Arakawa, Sekio Kanoh, and Kanehisa Hashimoto* 258
A Parallel between Two Techniques of Extraction of Connective Tissue Macromolecules *G. Bellon, J. Wegrowski, C. Perreau, A. Randoux, J. P. Borel, A. Malgras, and F. Chastang* 263
A Reverse-Phase Liquid Chromatographic Assay for Flavin-Containing Monooxygenase Activity *John R. Cashman and John Proudfoot* 274

Preparation of Bacteriophage λ DNA Using the TL-100 Ultracentrifuge
Michael F. Buckley and James W. Goding 281
Purification of Cardiac (Na^+,K^+)-Activated Adenosine Triphosphatase from Rat
Takahide Watanabe, Yuko Tawada, and Munekazu Shigekawa 284
Micro-Method for the Measurement of Carbonic Anhydrase Activity in Cellular Homogenates
Luc P. Brion, John H. Schwartz, Beth J. Zavilowitz, and George J. Schwartz 289
Alcian Blue Staining of Proteoglycans in Polyacrylamide Gels Using the "Critical Electrolyte Concentration" Approach *Rita S. Wall and Tracy J. Gyi* 298
Quantification of Albumin in Cerebrospinal Fluid *Peter L. Bonate* 300
Analysis of Phenylthiohydantoin Amino Acid Mixtures for Sequencing by Thermospray Liquid Chromatography/Mass Spectrometry
Bikash C. Pramanik, Stephen M. Hinton, David S. Millington, Theodore A. Dourdeville, and Clive A. Slaughter 305
The Analysis of Recombinant Interleukin-2 by Thermospray Liquid Chromatography–Mass Spectrometry
W. P. Blackstock, R. J. Dennis, S. J. Lane, J. I. Sparks, and M. P. Weir 319
Separation of Formyl-methionyl Transfer RNA, Methionyl Transfer RNA, and Transfer RNA^{fmet} Using Mixed-Mode High-Performance Liquid Chromatography on C_6-Modified Aminopropylsilyl-Hypersil *Robert D. Ricker and Akira Kaji* 327
Comparison of Different Methods for the Purification of Eosinophils from Human Peripheral Blood
Theresa P. Pretlow, Alev I. Wilk, Lisa A. Davis, and Robert A. Ortmann 334

BOOK REVIEWS

Methods in Enzymology, Vols. 154 and 155, *Recombinant DNA,* Parts E and F. Edited by R. Wu and L. Grossman Reviewed by *Theodore Friedmann* 342
Methods in Enzymology, Vol. 148, *Plant Cell Membranes.* Edited by Lester Packer and Roland Douce Reviewed by *C. F. Yocum* 342
Methods in Enzymology, Vol. 158, *Metallobiochemistry,* Part A. Edited by J. F. Riordan and B. L. Vallee Reviewed by *Boyd L. O'Dell* 343

ERRATUM

Volume 171, Number 1, May 15, 1988: Anthony Tsarbopoulos, Gerald W. Becker, John L. Occolowitz, and Ian Jardine, "Peptide and Protein Mapping by ^{252}Cf-Plasma Desorption Mass Spectrometry," pp. 113–123 345

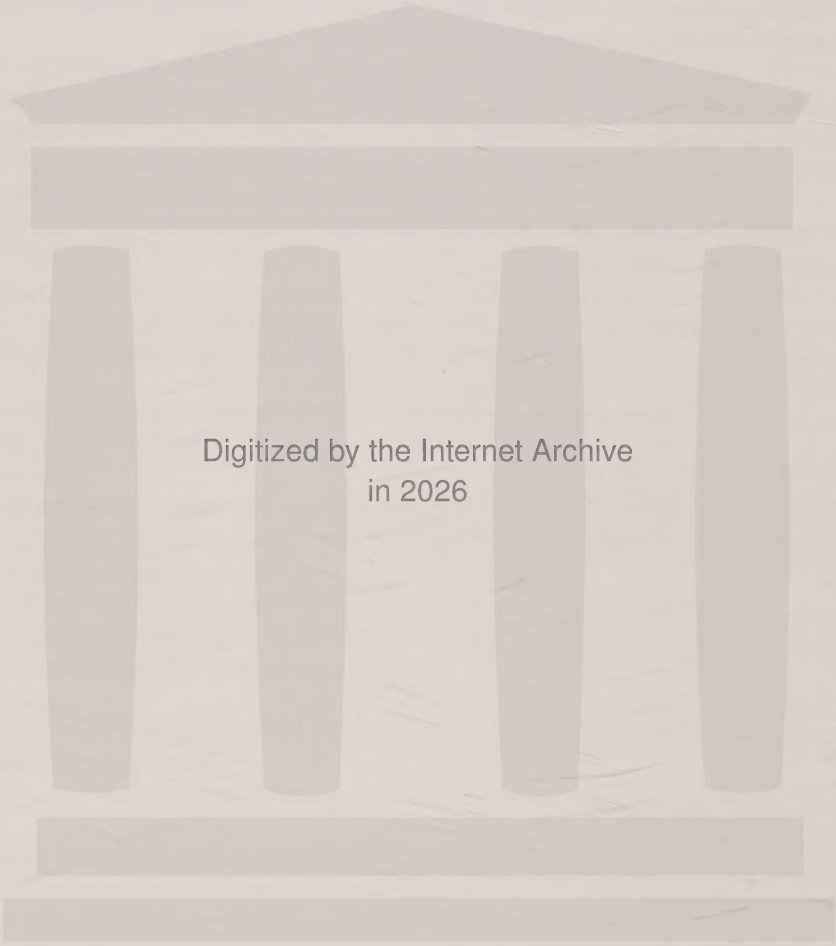
NUMBER 2, DECEMBER 1988

Review. Methods for Assaying Nonenzymatic Glycosylation *Anna J. Furth* 347
Review. Methods for the Genetics and Molecular Biology of *Candida albicans*
P. T. Magee, E. H. A. Rikkerink, and B. B. Magee 361
An Efficiently Mutagenizable Recombinant Plasmid for *in Vitro* Transcription of the *Escherichia coli* 16 S RNA Gene
W. J. Krzyzosiak, R. Denman, P. R. Cunningham, and J. Ofengand 373
Assessment of Enzyme Inhibition or Stimulation in Plasma Membrane Preparations
Wanda B. Mackinnon and Carolyn E. Mountford 386

Separation of Oligosaccharides Containing Terminal α-Linked Galactose Residues by Affinity Chromatography on *Griffonia simplicifolia* I Bound to Concanavalin A-Sepharose
Wei-Chun Wang, Gary F. Clark, David F. Smith, and Richard D. Cummings 390
Preparation of Biologically Intact Radioiodinated Hyaluronan of High Specific Radioactivity: Coupling of ^{125}I-Tyramine-Cellobiose to Amino Groups after Partial N-Deacetylation *Lauritz B. Dahl, Torvard C. Laurent, and Bård Smedsrød* 397
Assay of Glutathione Reductase in Crude Tissue Homogenates Using 5,5′-Dithiobis(2-nitrobenzoic Acid) *Ivan K. Smith, Thomas L. Vierheller, and Carol A. Thorne* 408
Plaque-Lift Testing of Expression Vector λgt11 with Gold-Labeled Immunoglobulins
Harald E. W. Pohl, Johann Hock, and Werner Müller-Esterl 414
Thermal Denaturation of Engineered Tet Repressor Proteins and Their Complexes with *tet* Operator and Tetracycline Studied by Temperature Gradient Gel Electrophoresis *Manfred Wagenhöfer, Dieter Hansen, and Wolfgang Hillen* 422
Sedimentation Field Flow Fractionation of Fused Unilamellar Vesicles: Comparison with Electron Microscopy and Gel Filtration
Robert Dreyer, Edward Hawrot, Alan C. Sartorelli, and Panayiotis P. Constantinides 433
Salt Stimulation of Serum Insulin-like Growth Factor Binding Protein Activity
Jerzy Palka and Beverly Peterkofsky 442
Expression of Met-(−1) Angiogenin in *Escherichia coli:* Conversion to the Authentic <Glu-1 Protein *Robert Shapiro, J. Wade Harper, Edward A. Fox, Hans-Willi Jansen, Friedrich Hein, and Eugen Uhlmann* 450
Small Zone Gel Chromatography of Interacting Systems: Theoretical and Experimental Evaluation of Elution Profiles for Kinetically Controlled Macromolecule–Ligand Reactions
John R. Cann, Eunice J. York, John M. Stewart, Juan C. Vera, and Ricardo B. Maccioni 462
A Nondenaturing Vertical Isoelectric Focusing Polyacrylamide Slab Gel System Suitable for Silver Staining and Electrophoretic Blotting
Robert S. Warlow, Janelle Morgan, Nicos Nicola, and Claude C. A. Bernard 474
A Rapid, Sensitive High-Performance Liquid Chromatography Analysis of Ammonia and Methylamine for Nitrogenase Assays
M. Bravo, H. Eran, F. X. Zhang, and C. E. McKenna 482
Determination of Protein Size in Chromatography Column Eluants by On-Line Photon Correlation Spectroscopy
R. J. G. Carr, J. G. Rarity, A. G. Stansfield, R. G. W. Brown, D. J. Clarke, and T. Atkinson 492
Northern Blot Mapping: A Procedure for Mapping mRNA Immobilized on Nitrocellulose by Probing with End-Labeled DNA Fragments *Richard Hamelin* 500
Analysis of Ligand–Receptor Binding by the Difference Method
Elena M. Melikhova, Ilya N. Kurochkin, Sergei V. Zaitsev, and Sergei D. Varfolomeev 507
A Reliable Analysis of Tissue Free Fatty Acids by Gas–Liquid Chromatography
Kouji Kishiro and Hiroshi Yasuda 516
A DNA Sequencing Strategy *Yu-May Lee and Sheng-Chung Lee* 521
Colorimetric Determination of Neutral Sugars by a Resorcinol Sulfuric Acid Micromethod *Michel Monsigny, Claire Petit, and Annie-Claude Roche* 525
In Situ Assay of Intracellular Enzymes of Yeast (*Kluyveromyces fragilis*) by Digitonin Permeabilization of Cell Membrane
L. R. Gowda, M. S. Joshi, and S. G. Bhat 531

Processing-Independent Radioimmunoanalysis: A General Analytical Principle Applied to Progastrin and Its Products *Linda Bardram and Jens F. Rehfeld* 537
Determination of the Molecular Weight of Proteins by Electrophoresis in Slab Gels with a Transverse Pore Gradient of Crosslinked Polyacrylamide in the Absence of Denaturing Agents *Claudio Retamal and Jorge Babul* 544
Differential Identification of *Candida* Species and Other Yeasts by Analysis of [^{35}S]Methionine-Labeled Polypeptide Profiles
Horng-Der Shen, Kong-Bung Choo, Wen-Cherng Tsai, Tien-Ming Jen, Jan-Ying Yeh, and Shou-Hwa Han 548
A Tandem Chromatographic Column Method for Assaying cAMP-Dependent Protein Kinase and Protein Kinase C with Synthetic Peptide Substrates
John J. Egan, Min-Kun Chang, and Constantine Londos 552
Simultaneous Determination of Noradrenaline and 3-Methoxy-4-hydroxyphenylglycol in Plasma with High-Performance Liquid Chromatography Using Electrochemical Detection *Mitsuko Okada, Kazunori Mine, Toshiyuki Noda, Yasufumi Kataoka, and Tetsuya Nakagawa* 562
Raw Starch Adsorption–Desorption Purification of a Thermostable β-Amylase from *Clostridium thermosulfurogenes*
Badal C. Saha, Lloyd W. Lecureux, and J. Gregory Zeikus 569
Preparation of Cellodextrins and Isolation of Oligomeric Side Components and Their Characterization *Georg Schmid, Manfred Biselli, and Christian Wandrey* 573

AUTHOR INDEX FOR VOLUME 175 584
CUMULATIVE AUTHOR INDEX FOR VOLUMES 168–175 586
CUMULATIVE SUBJECT INDEX FOR VOLUMES 168–175 597



Digitized by the Internet Archive
in 2026

https://archive.org/details/analytical-biochemistry_1988_175_contents

INFORMATION FOR AUTHORS

Analytical Biochemistry is an international journal that publishes original articles on methods and methodology of interest to the biological sciences and all fields that impinge on biochemical investigation. In addition to the expected techniques that apply to biochemical preparations and analysis, the following should be considered as within the scope of the journal:

— Cell biology and cell, tissue, and organ culture methods that are of general application.

— Membranes and membrane proteins. These methods form a major section of interest.

— Procedures of interest in the field of molecular genetics including those necessary for cloning, sequencing, and synthesis of nucleic acids and for mutagenesis.

— Purification of enzymes and other proteins, but only if the methods are both novel and applicable generally, i.e., the interest is in a means of purification rather than in the protein that is being purified.

— Immunological techniques both analytical and preparative, if they are of general applicability by biochemists. Immunoassays are included but only if a unique approach is introduced rather than the determination of a substance not previously assayable.

— Pharmacological and toxicological research techniques that offer a biochemical approach.

— Review articles dealing with timely topics. Although these are generally invited, unsolicited outlines or manuscripts will be considered.

Manuscripts are accepted for review with the understanding that the same work has not been and will not be nor is presently submitted elsewhere, and that its submission for publication has been approved by all of the authors and by the institution where the work was carried out; further, that any person cited as a source of personal communications has approved such citation. Written authorization may be required at the Editor's discretion. Articles and any other material published in *Analytical Biochemistry* represent the opinions of the author(s) and should not be construed to reflect the opinions of the Editor(s) and the Publisher.

Authors submitting a manuscript do so on the understanding that if it is accepted for publication, copyright in the article, including the right to reproduce the article in all forms and media, shall be assigned exclusively to the Publisher. The Publisher will not refuse any reasonable request by the author for permission to reproduce any of his or her contributions to the journal.

Address. Manuscripts should be submitted in quadruplicate to *Analytical Biochemistry*, Editorial Office, Seventh Floor, 1250 Sixth Avenue, San Diego, California 92101. In the case of rejected manuscripts, only one copy of the manuscript will be returned to the author.

An extended Instructions to Authors is published in the July issue during odd-numbered years. Reprints are available from the Editorial Office. Authors should consult this Information for details on nomenclature, IUPAC-IUB rules and recommendations, and accepted abbreviations.

Manuscripts should be concise and consistent in style, spelling, and use of abbreviations. In order to facilitate the processing of manuscripts, the journal requests that at least four copies be submitted, each copy to include all figures (originals or glossy prints) and tables. The original copy must be typewritten, double-spaced, on one side of white bond paper, about $8\frac{1}{2} \times 11$ inches in size, with one-inch margins on all sides. Each manuscript should have a separate title page noting title of article, authors' names (without degrees), a running title (not exceeding 55 letters and spaces), an abstract (250 words), the address to which proof should be mailed, and the corresponding author's telephone number and fax or telex number. In creating a title for your paper, please omit words such as *novel*, *rapid*, *improved*, *simple*, *sensitive*, *efficient*, *convenient*, *new*. Each is felt to be redundant and actually slows down the reader who is scanning the article titles and wants to know more about the method itself. Please substitute informative words that will give readers a more complete idea of the usefulness of your paper with regard to the limitations of their equipment or sample type. For example, what *kind* of method are you describing? Abbreviations should not be used in the article title or running title.

Please number all pages of the manuscript.

Authors should indicate the following on the title page: (1) the appropriate subject category for listing in the Table of Contents; (2) six descriptive key words for computer-aided selection of reviewers. (Please see the Appendix at the end of the extended Instructions to Authors published in the July issue during odd-numbered years for a list of recommended key words.) These words will also be used in the preparation of the annual cumulative subject index for the journal.

Text. The suggested organization of an article is: abstract; introductory statement; Materials and Methods; Results; Discussion; Acknowledgments; References. Some of these sections may be combined if the presentation is thereby made clearer or more effective. Although this is the general form, the journal will accept short papers of approximately two printed pages that are arranged without specific sections except for a short abstract.

Names of chemical or organic substances should follow the recommendations of the IUPAC–IUB Combined Commission on Biochemical Nomenclature (CBN) as published in the extended Instructions for Authors, appearing in the July issue of this journal.

Authors should draw attention to any particular chemical or biological hazards that may be involved in carrying out the experiments described. Any relevant safety precautions should be

described; if an accepted code of practice has been followed, a reference to the relevant standards should be given.

Figures should be numbered consecutively with Arabic numerals in order of mention in the text: each figure should have a descriptive legend. Legends should be typed together on a separate sheet, double-spaced. All illustrations should be in finished form ready for photoreproduction. A convenient size for drawings is $8\frac{1}{2} \times 11$ in. (21×27.5 cm). Drawings should be made with India ink on tracing linen, smooth surface white paper, or Bristol board. Graph paper if used should be ruled in blue. Grid lines that are to show in the final reproduction should be inked in black. Glossy prints properly prepared are acceptable.

Photographs must be kept to a minimum. All photographs should be submitted as single glossy prints with strong contrasts and not mounted on cardboard; the magnification should be indicated by a scale where possible. **Simple histograms should be avoided. A table or a paragraph in the text is preferred.**

Illustrations in color can be accepted only if the authors defray the cost.

Tables should be typed on separate pages, numbered consecutively with Arabic numerals in order of mention in the text. Each table should have a short explanatory title.

Authors may wish to submit complex tables as camera-ready copy. In this way, they are spared tedious proofreading and the chance of error is reduced. Tables submitted as camera-ready copy should be typed single-spaced whenever possible, and preferably submitted as 5×7-in. glossy prints.

Footnotes should be designated in text by superscript numbers and typed on a separate sheet. Footnotes to tables should be identified with lowercase italic superscript letters and placed at the bottom of the table.

References to the literature should be cited in the text by Arabic numerals in parentheses and listed at the end of the paper in consecutive order. Abbreviations of journal titles should follow the style used in *Chemical Abstracts Service Source Index,* 1985. Please note style of capitalization and punctuation for journal articles and edited books in the following examples:

1. Jackson, G. E. D., and Young, N. M. (1987) *Anal. Biochem.* **162,** 251–256.
2. Bovey, F. A., and Jelinski, L. W. (1983) Chain Structure and Conformation of Macromolecules, p. 150, Academic Press, New York.
3. Britton, G. (1985) *in* Methods in Enzymology (Law, J. H., and Rilling, H. C., Eds.), Vol. 111, pp. 113–149, Academic Press, Orlando, FL.

Proofs. Proofs will be sent to the authors with reprint order forms. Fifty reprints of each article are provided free of charge. Additional reprints may be ordered using the form provided.

For information about advertising in *Analytical Biochemistry*, please contact Calvin Caldwell, Advertising Coordinator, Journal Promotion Department, Academic Press, Inc., 1250 Sixth Avenue, San Diego, California 92101 (telephone: (619) 230-1840).

JOURNAL OF FOOD COMPOSITION AND ANALYSIS

An official publication of the United Nations University
International Network of Food Data Systems

Editor

Kent K. Stewart

Virginia Polytechnic Institute and State University, Blacksburg, Virginia, U.S.A.

Associate Editors

George H. Beaton, *Canada*

Ricardo Bressani *Guatemala*

Osman Galal *Egypt*

William M. Rand *U.S.A.*

D. A. T. Southgate *United Kingdom*

Kyoden Yasumoto *Japan*

The ***Journal of Food Composition and Analysis*** is devoted to all scientific aspects of the data on chemical composition of human foods. The journal emphasizes new methods of analysis; data on composition of foods; studies on the manipulation, storage, distribution, and use of food composition data; and studies on the statistics and distribution of such data and data systems.

Features

- Data and methods for natural and/or normal chemical and biochemical components of human foods—including nutrients, toxicants, flavors, colors, and functional additives
- Methods for determination of inadvertent materials in foods—including pesticides, agricultural chemicals, heavy metals, general environmental contaminants, and chemical and biochemical toxicants of microbiological origin

Research Areas Include

- Computer technology and information systems theory directly relating to food composition database development, management, and utilization
- Effects of processing, genetics, storage conditions, growing conditions, etc., on the levels of chemical and biochemical components of foods
- Processes of development and selection of single-value entries for food composition tables
- Quality control procedures and standard reference materials for use in the assay of food components
- Statistical and mathematical manipulations involved with the preparation and utilization of food composition data

Volume 2 (1989), 4 issues
ISSN 0889-1575

In the U.S.A. and Canada: $70.00
All other countries: $82.00

Sample copies and privileged personal rates are available.
For more information, please write or call:
ACADEMIC PRESS, INC., Journal Promotion Department
1250 Sixth Avenue, San Diego, CA 92101, U.S.A. (619) 230-1840

Academic Press, Inc.
Harcourt Brace Jovanovich, Publishers

San Diego New York Boston London Sydney Tokyo Toronto

S9015

All prices are in U.S. dollars and are subject to change without notice.

BIOTECHNOLOGY AND APPLIED BIOCHEMISTRY

Editor-in-Chief
P. N. Campbell
Department of Biochemistry, University College London, United Kingdom

Regional Editors
Z. Shaked, CODON, South San Francisco, California
K. Yagi, Institute of Applied Biochemistry, Gifu, Japan

Biotechnology and Applied Biochemistry is concerned with results of fundamental studies directly related to the design of new biotechnology, the improvement of existing biochemical processes, and the preparation, utilization, conversion, or application of biological materials. The journal encourages the development of the multidisciplinary teams that are vital to the future of biotechnology and publishes articles that demonstrate a role for biochemistry in biotechnology.

Features

- Original research
- Review articles
- Commentaries

Research Areas Include

- Agriculture
- Biotechnology
- Clinical chemistry
- Energy production
- Enzyme technology
- Fermentation technology and microbial processes
- Food and beverage industries
- Medicine
- Pharmaceutical industry

Published for the International Union of Biochemistry by Academic Press

Volume 11 (1989), 6 issues ISSN 0885-4513 All countries: $90.00
For a free sample copy or for more information, please write or call:

ACADEMIC PRESS, INC.
Journal Promotion Department
1250 Sixth Avenue, San Diego, CA 92101, U.S.A.
(619) 230-1840

All prices are in U.S. dollars and are subject to change without notice.

S9025